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Losos et al.

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(54) **ADJUSTABLE LUMBAR SUPPORT FOR MOUNTING ON A BACKPACK AND BACKPACK HAVING THE SAME**

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A45F 3/10	(2006.01)
A45F 3/12	(2006.01)

(52) **U.S. Cl.**

CPC . ***A45F 3/047*** (2013.01); ***A45F 3/10*** (2013.01); *A45F 2003/045* (2013.01); *A45F 2003/127* (2013.01)

(58) **Field of Classification Search**

CPC A45F 3/04; A45F 2003/045; A45F 3/047; A45F 2003/127

USPC 224/627, 628, 631, 632, 637, 262; 128/205.22; 405/185

See application file for complete search history.

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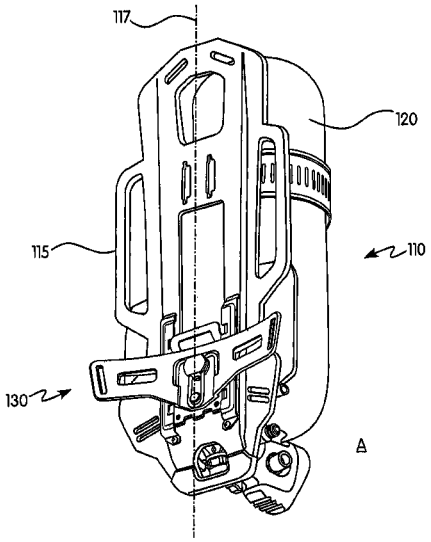
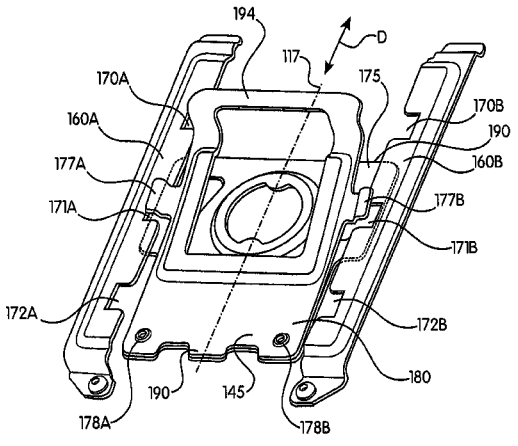
(57) **ABSTRACT**

An adjustable lumbar support for mounting upon the chassis of a backpack has a lumbar support pad and a slider assembly slidably attaching the lumbar support pad to the chassis. The assembly has a locking slider that, together with the support pad, is indexable to at least two different positions along the chassis. A backpack may have such an adjustable lumbar support.

18 Claims, 10 Drawing Sheets





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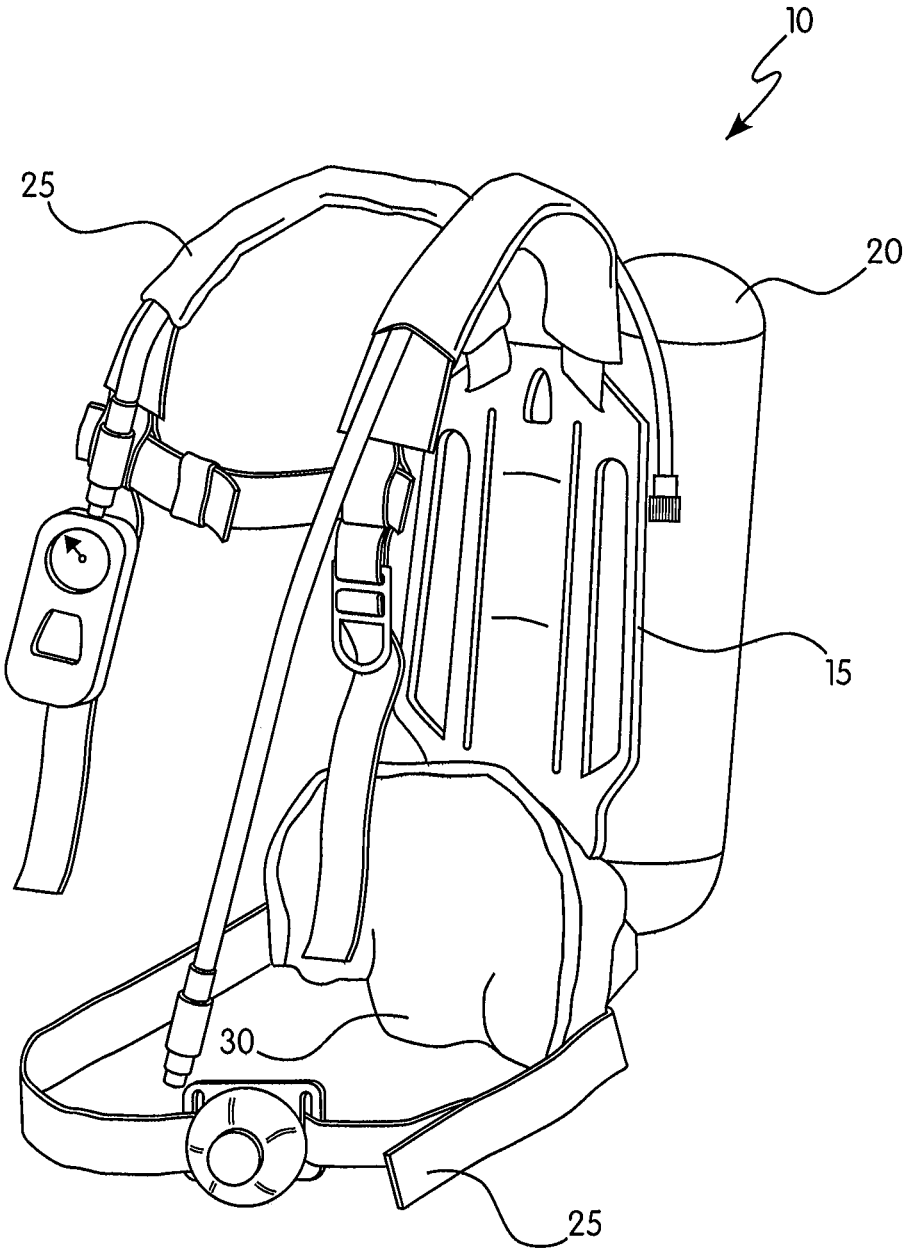

FIG. 1
(Prior Art)

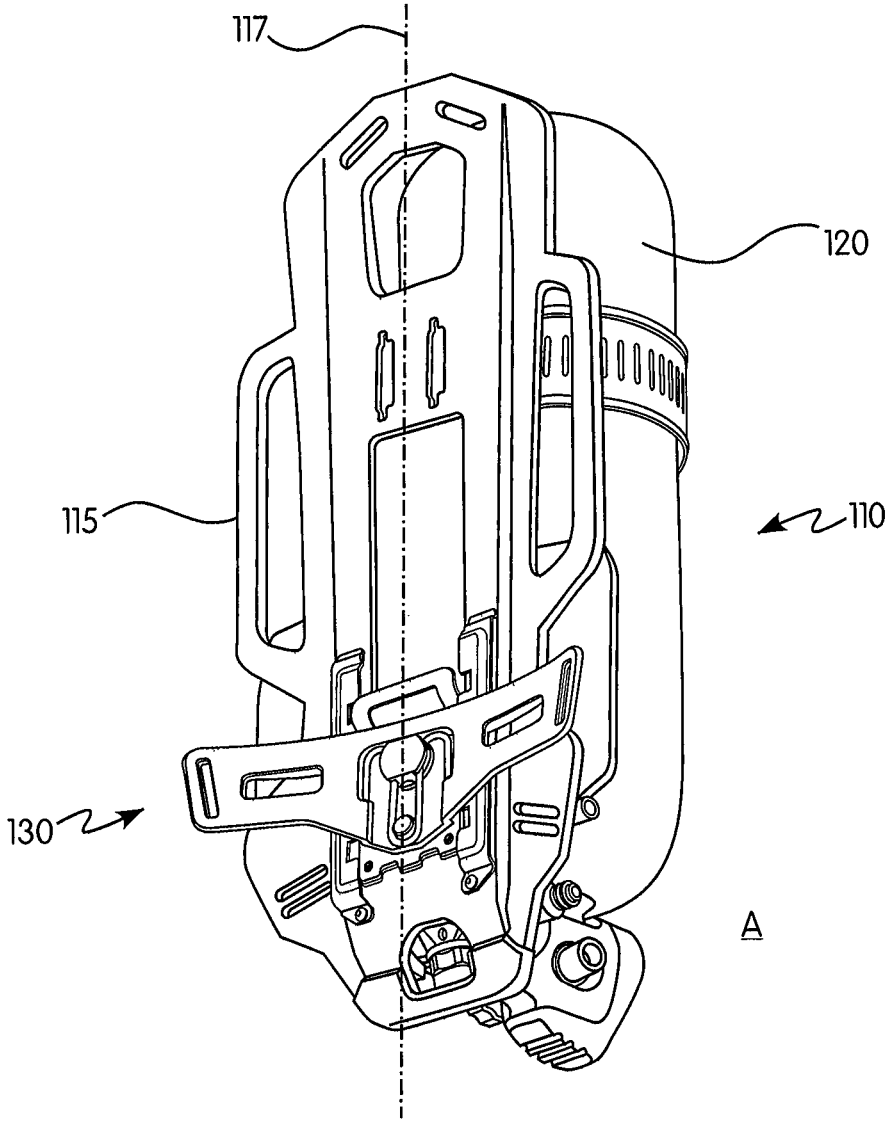

FIG. 2

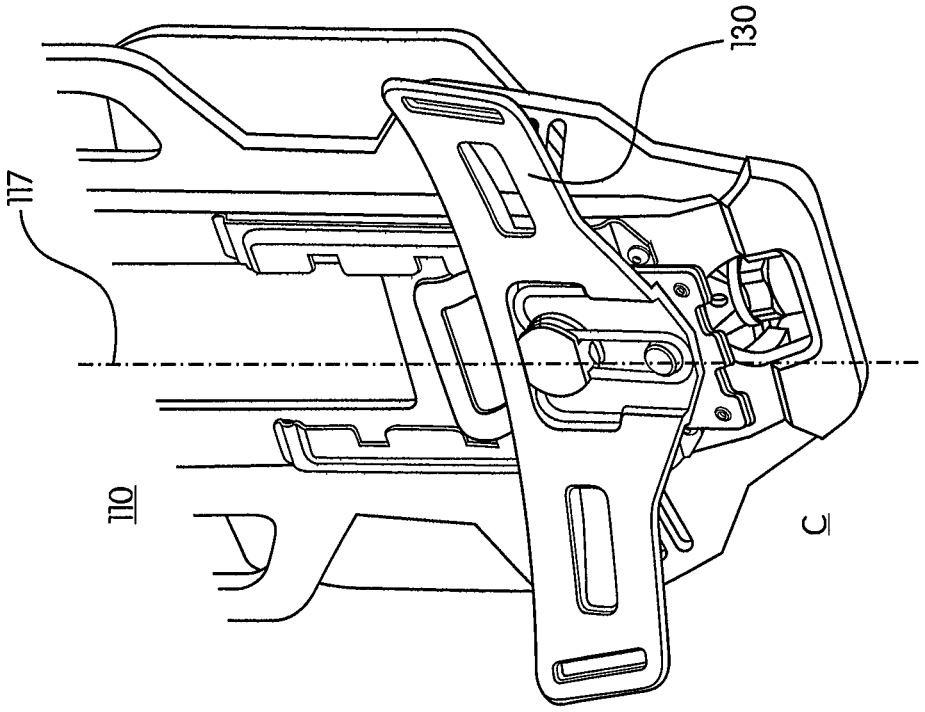

FIG. 3B

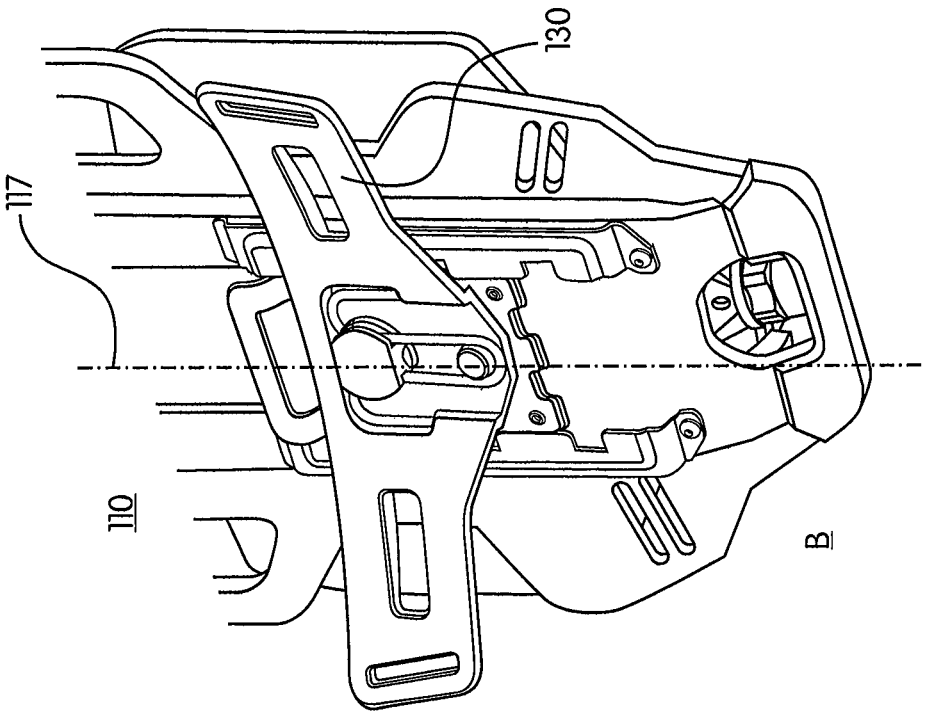

FIG. 3A

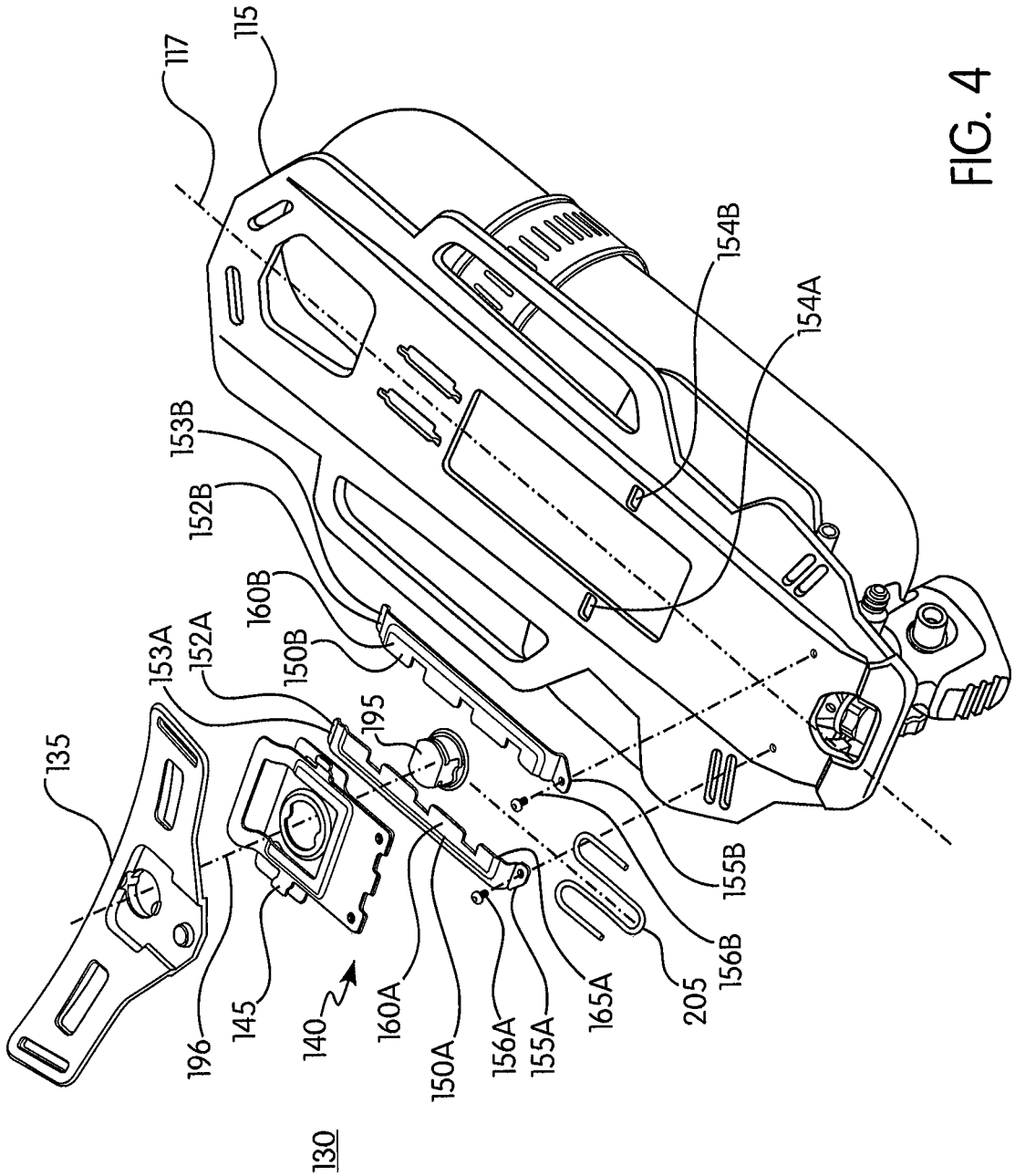
117
115
154B
154A
153B
152B
160B
150B
153A
152A
195
135
155B
156B
205
165A
155A
156A
150A
160A
140
145
196
130

FIG. 4

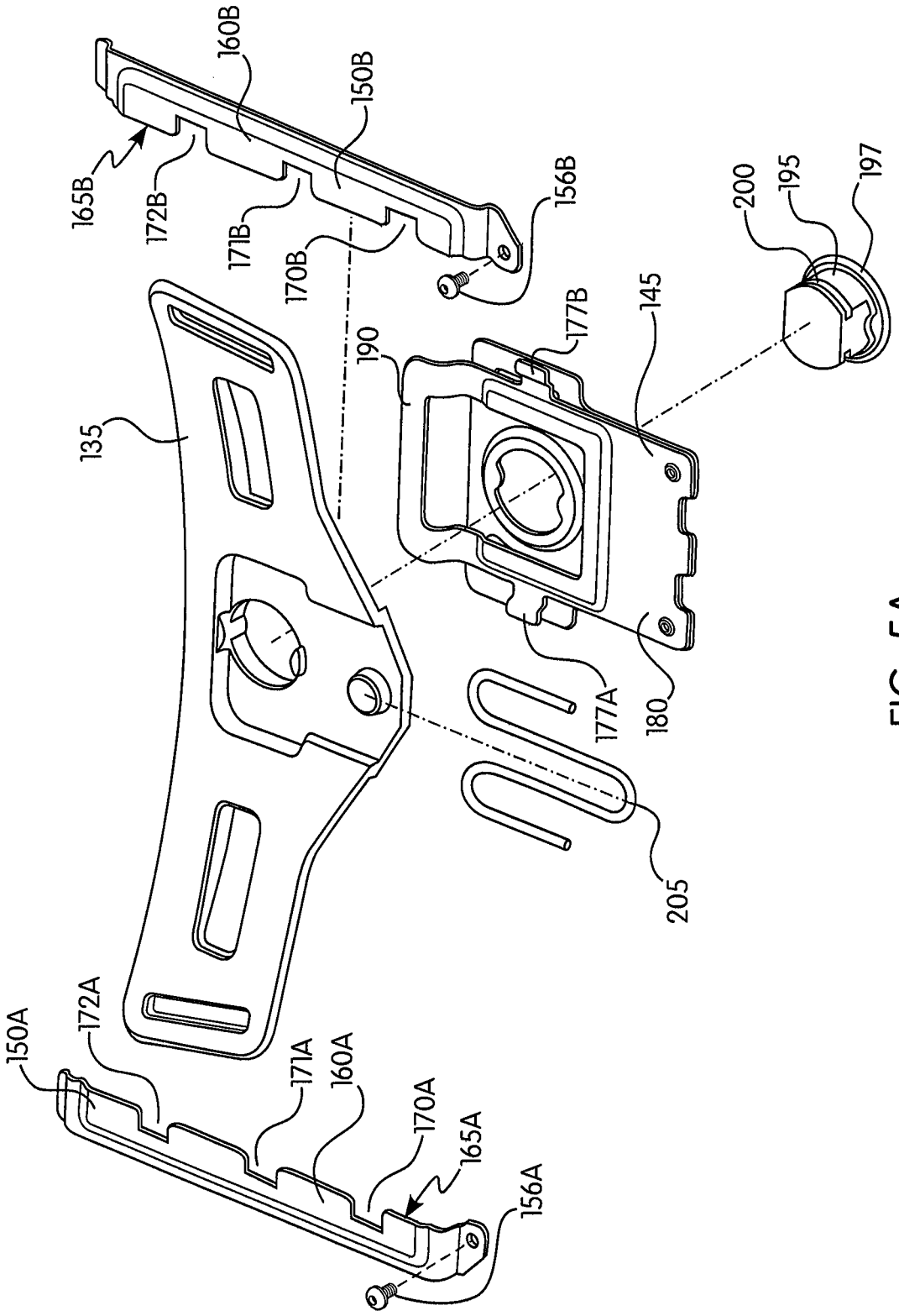
160B
150B
165B
172B
171B
170B
156B
200
195
197
190
177B
145
135
177A
180
205
150A
172A
171A
160A
170A
165A
156A

FIG. 5A

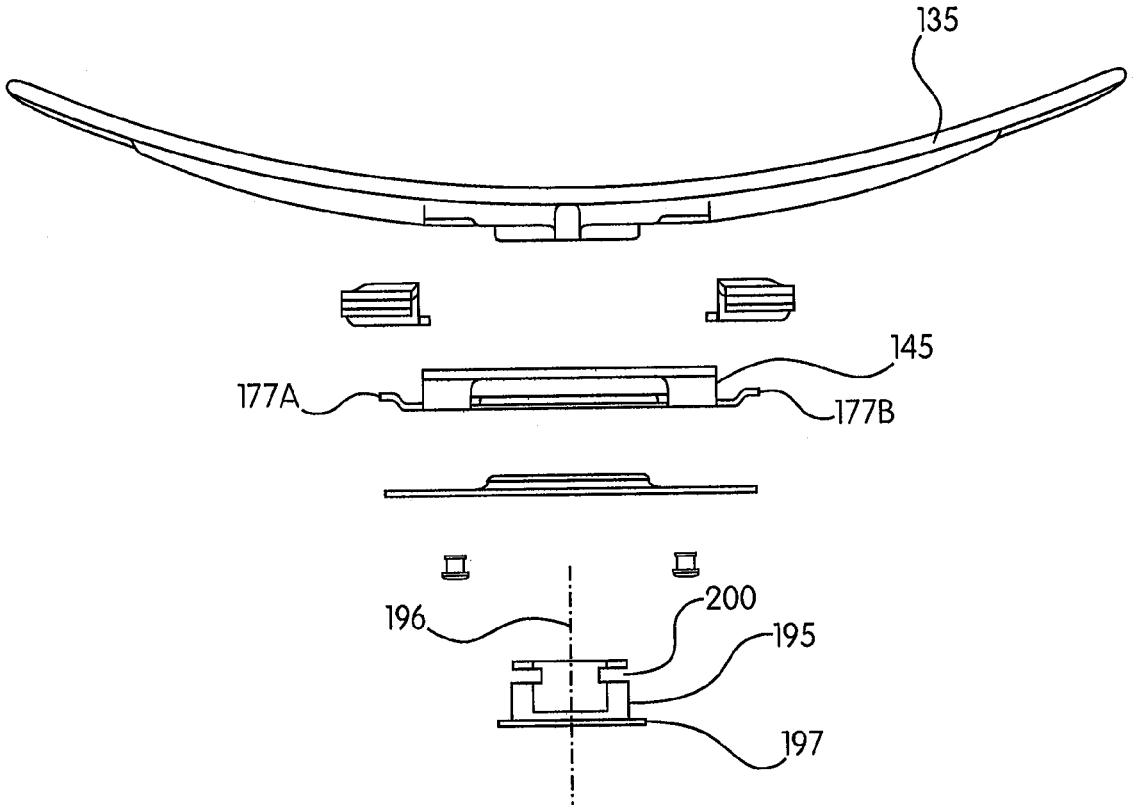

FIG. 5B

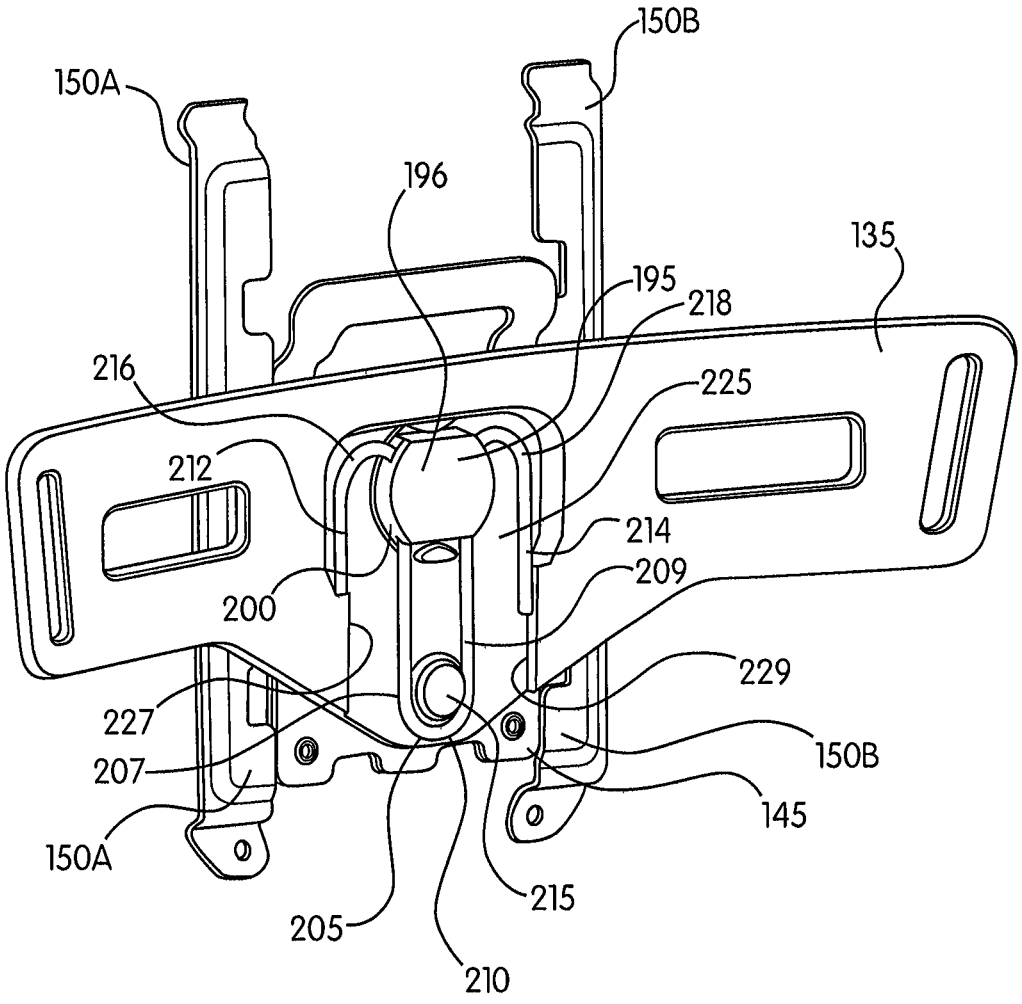
150B
150A
196
135
195
218
216
225
212
214
209
200
229
227
150B
207
145
150A
215
205
210

FIG. 6

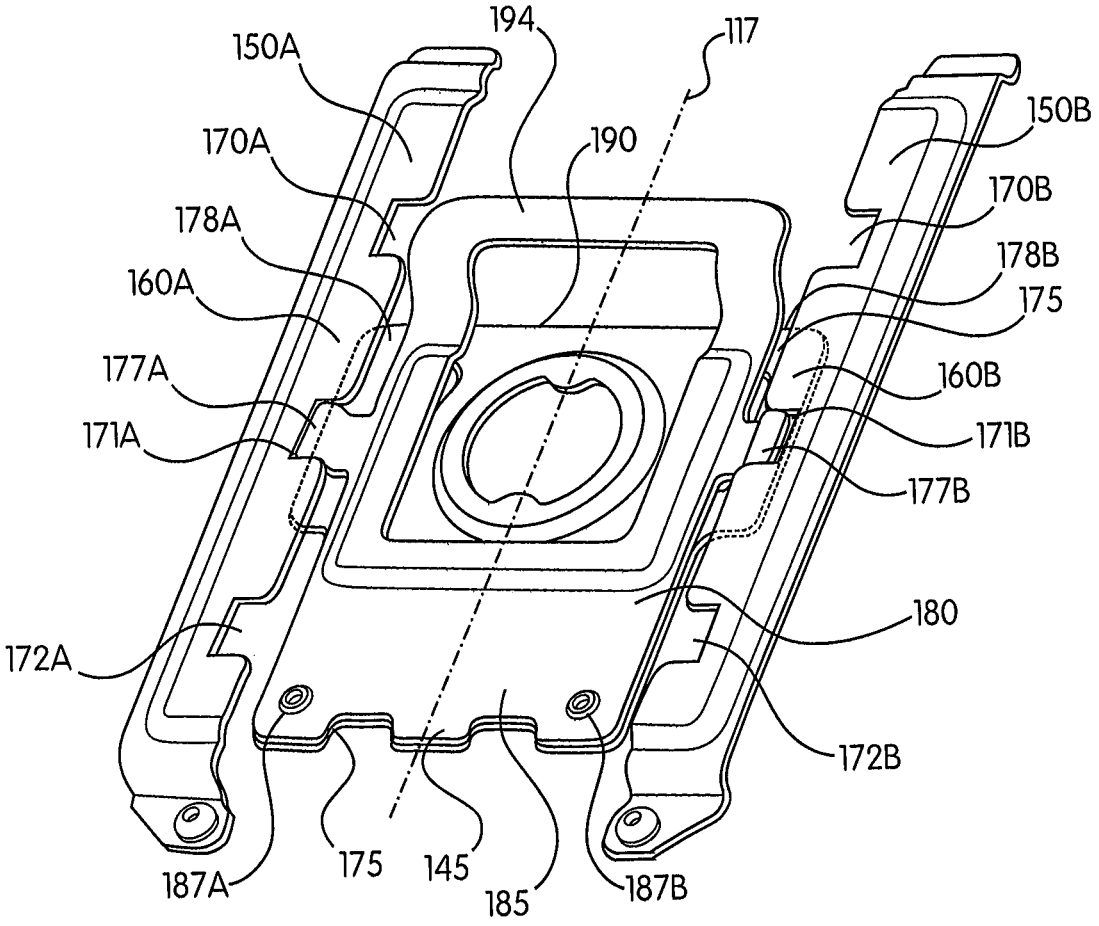
194
117
150A
150B
170A
190
170B
178A
178B
160A
175
177A
160B
171A
171B
177B
180
172A
172B
187A
175
145
185
187B

FIG. 7

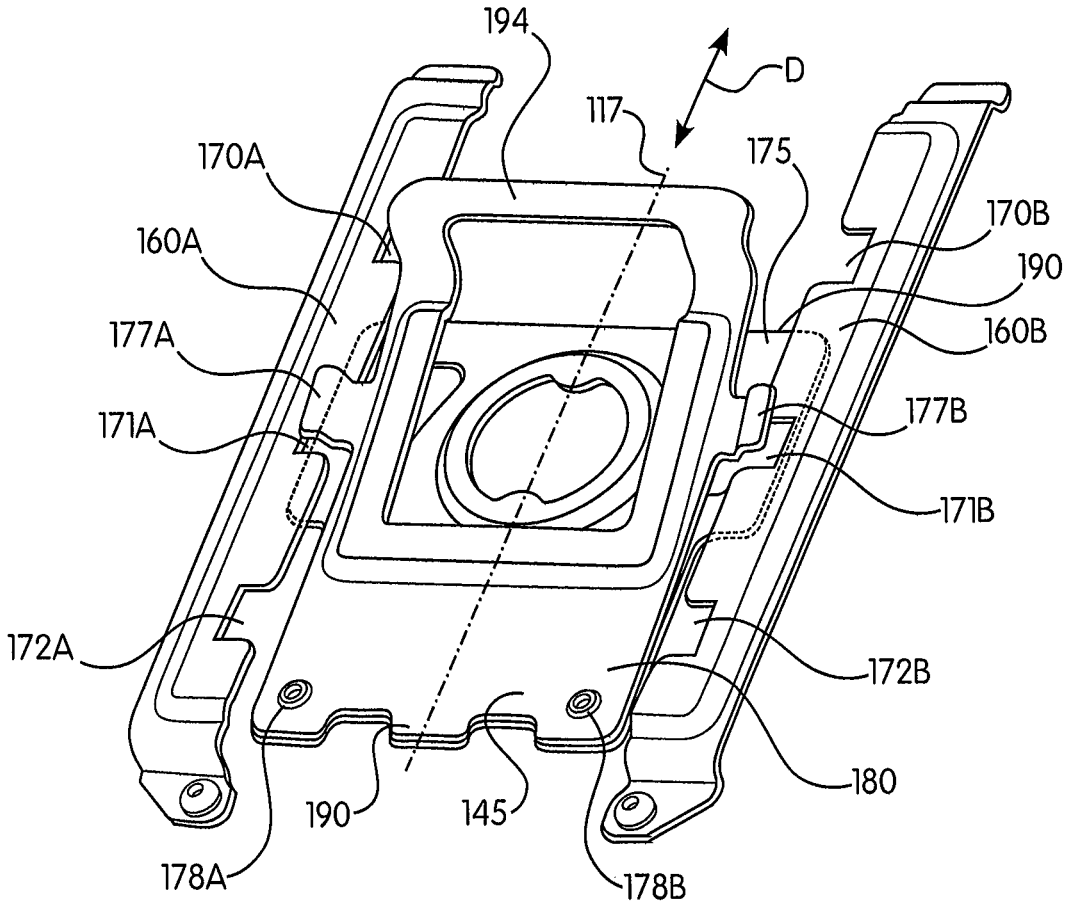
194
D
117
175
170A
170B
160A
190
177A
160B
171A
177B
171B
172A
172B
180
190
145
178A
178B

FIG. 8

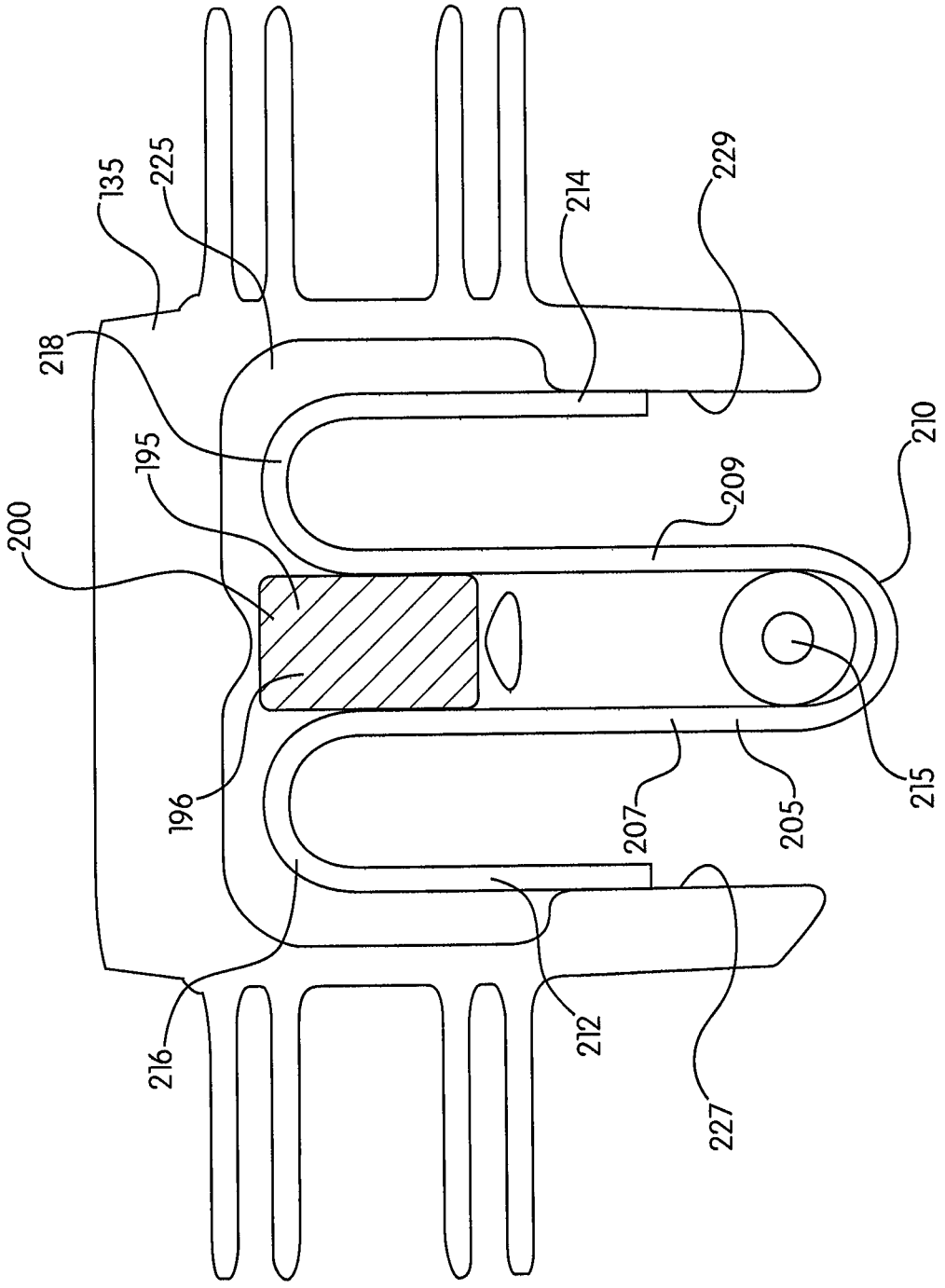

FIG. 9

ADJUSTABLE LUMBAR SUPPORT FOR MOUNTING ON A BACKPACK AND BACKPACK HAVING THE SAME

CROSS REFERENCE TO RELATED APPLICATIONS

This application claims benefit of priority from U.S. Provisional Patent Application No. 61/909,463, filed Nov. 27, 2013, which is incorporated herein by reference in its entirety.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to a backpack and, more particularly, to a lumbar support that may be used on a backpack wherein the lumbar support may be indexed to different positions on the backpack to accommodate a user and may be rotated on the backpack to accommodate the user.

2. Description of Related Art

Backpacks used for self-contained breathing apparatus (SCBA) are typically used by first responders or rescuers in an environment in which the air is heated and/or contaminated. Frequently, the first responder is in a situation where physical agility is paramount. Therefore, any factor that contributes to the efficiency of the first responder is important. Included in these factors is properly-fitted equipment. Typically, the backpack for an SCBA is a standard size and strap adjustments are made for the different sizes of an individual. However, while straps for such apparatus may be easily adjustable, the base of the backpack typically includes a lumbar support, and it is important for this lumbar support to be located properly in the lumbar region of the individual.

Therefore, there is a need in the art for an arrangement for adjusting a lumbar support on the backpack but, furthermore, for an arrangement that is relatively simple and robust.

Additionally, many backpacks include a lumbar support that is rigidly attached to the chassis of the backpack. Therefore, there is a further need in the art for a lumbar support that is firmly secured to the backpack but, at the same time, permits for some rotation relative to the backpack chassis to accommodate the motion of the user.

SUMMARY OF THE INVENTION

Generally, provided is a lumber support that improves upon and provides additional features with respect to known backpacks having lumbar supports. Preferably, provided is a lumbar support for a backpack used with an SCBA that allows adjustment of the lumbar support along a portion of the length of the backpack. Preferably, provided is an adjustment arrangement that is simple to use and robust. Preferably, provided is a lumbar support that permits rotation of the lumber support on the backpack to accommodate the motion of the user.

In one preferred and non-limiting embodiment, provided is an adjustable lumbar support for mounting upon the chassis of a backpack and includes a lumbar support pad and a slider assembly slidably attaching the lumbar support pad to the chassis. The assembly has a locking slider that, together with the support pad, is indexable to at least two different positions along the chassis.

In another preferred and non-limiting embodiment, provided is a rotatable lumbar support for mounting upon the chassis of a backpack comprised of a lumbar support pad and a connector having a central axis. The connector secures the lumbar support pad to the chassis and allows the lumbar support pad to rotate about the central axis relative to the chassis.

In a further preferred and non-limiting embodiment, provided is a backpack having an adjustable lumbar support comprised of a chassis with a longitudinal axis, a lumbar support pad, and a slider assembly slidably attaching the lumbar support pad to the chassis. The assembly has a locking slider that, together with the support pad, is indexable to at least two different positions along the chassis.

These and other features and characteristics of the present invention, as well as the methods of operation and functions of the related elements of structures and the combination of parts and economies of manufacture, will become more apparent upon consideration of the following description and the appended claims with reference to the accompanying drawings, all of which form a part of this specification, wherein like reference numerals designate corresponding parts in the various figures. It is to be expressly understood, however, that the drawings are for the purpose of illustration and description only and are not intended as a definition of the limits of the invention. As used in the specification and the claims, the singular form of "a", "an", and "the" include plural referents unless the context clearly dictates otherwise.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is prior art and illustrates a self-contained breathing apparatus (SCBA) with a backpack and lumbar support;

FIG. **2** illustrates a preferred and non-limiting embodiment of the invention showing the adjustable lumbar support in a first position on the chassis of the backpack;

FIGS. **3**A and **3**B illustrate preferred and non-limiting embodiments of the invention showing the adjustable lumbar support in different positions on the chassis of the backpack;

FIG. **4** illustrates an exploded view of an adjustable lumbar support assembly in accordance with the subject invention;

FIG. **5**A illustrates an exploded close-up view of the adjustable lumbar support assembly in FIG. **4**;

FIG. **5**B illustrates an exploded top view of the arrangement illustrated in FIG. **5**A;

FIG. **6** illustrates an assembled view of the adjustable lumbar support assembly;

FIG. **7** and FIG. **8** illustrate perspective views of a portion of the adjustable lumbar support assembly with a slider in a first engaged position and a second disengaged position; and

FIG. **9** illustrates a side view of the lumbar pad illustrating the manner by which the spring clip retains the pad to the chassis.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

For purposes of the description hereinafter, the terms "end", "upper", "lower", "right", "left", "vertical", "horizontal", "top", "bottom", "lateral", "longitudinal" and derivatives thereof shall relate to the invention as it is oriented in the drawing figures. However, it is to be understood that the invention may assume various alternative variations and step sequences, except where expressly specified to the contrary. It is also to be understood that the specific devices and processes illustrated in the attached drawings, and described in the following specification, are simply exemplary embodiments of the invention. Hence, specific dimensions and other physical characteristics related to the embodiments disclosed herein are not to be considered as limiting.

FIG. **1** illustrates an existing backpack **10** of a self-contained breathing apparatus (SCBA), which includes a chassis **15** with an air cylinder **20** secured thereto. Mounting straps **25** secure the backpack **10** to an individual while a lumbar support **30** provides comfort to the user. It is desired to provide a design whereby the lumbar support **30** may be indexed to different positions along the chassis **15** to accommodate the size of a particular user and to enhance comfort.

FIG. **2** illustrates one preferred and non-limiting embodiment of a backpack **110** with a chassis **115** for holding an air cylinder **120**. An adjustable lumbar support **130** is illustrated in one position A along the longitudinal axis **117** of the chassis **115**, while FIGS. **3**A and **3**B illustrate a portion of the same backpack **110** with the lumbar support **130** shown in different positions B and C along the longitudinal axis **117**.

As shown in FIG. **4**, the adjustable lumbar support **130** includes a lumbar support pad **135** and a slider assembly **140** attaching the lumbar support pad **135** to the chassis **115**. The assembly **140** has a locking slider **145** that, together with the support pad **135**, is indexable to multiple, different positions (e.g., positions A, B, and C) along the longitudinal axis **117** of the chassis **115**, as illustrated in FIGS. **2**, **3**A, and **3**B.

The slider assembly **140** includes rails, which may be in the form of opposing retention covers **150**A, **150**B adapted to be secured to the chassis **115**. In particular, each retention cover **150**A, **150**B includes a first end mount **152**A, **152**B including a projection **153**A, **153**B that is at least partially accepted within receiving apertures **154**A, **154**B of the chassis **115**, which engage the end mounts **152**A, **152**B. Second end mounts **155**A, **155**B may be secured to the chassis **115** with screws **156**A, **156**B. It should be noted that it is possible to secure the retention covers **150**A, **150**B to the chassis **115** in a variety of different ways, and the manner disclosed is one of many of those different varieties.

It should be noted that, in one preferred and non-limiting embodiment, the only place in which the slider assembly **140** is attached to the chassis **115** is through the retention covers **150**A, **150**B, and all of the remaining components move as a single unit relative to the retention covers **150**A, **150**B.

Henceforth, it should be appreciated that retention covers **150**A, **150**B are symmetric with one another about the longitudinal axis **117** and, for that reason, the features associated with retention cover **150**A will be discussed with the understanding that the same features are applicable to retention cover **150**B.

Retention cover **150**A, as seen in FIGS. **4** and **5**A, includes an elevated portion **160**A defining a channel **165**A through which the locking slider **145** moves. Each retention cover, such as retention cover **150**A, has perforations or slots **170**A, **171**A, **172**A adapted to engage the locking slider **145** at different indexed positions. In particular, as illustrated in FIGS. **7** and **8**, as the locking plate **180**, with associated tabs **177**A, **177**B, is lifted or urged away from the retainer plate **175**, the tabs **177**A, **177**B are removed from the respective perforations **171**A, **171**B, and the locking slider **145** may be moved such that the tabs **177**A, **177**B may be indexed with other perforations **170**A, **170**B or **172**A, **172**B. While the perforations **170-172** are illustrated as slots extending completely through the elevated portion **160**A, **160**B of the retention covers **150**A, **150**B, it is also possible for the perforations **170-172** to extend only partially through the elevated portion **160**A, **160**B, so long as the tabs **177**A, **177**B are able to engage the perforations sufficiently to prevent motion of the locking slider **145** along the longitudinal axis **117**.

With further reference to FIGS. **5**A and **5**B, and in one preferred and non-limiting embodiment, the tabs **177**A, **177**B are in a "serpentine" or substantially "S"-shaped form. This form facilitates the quick and effective movement of the tabs **177**A, **177**B into and out of the perforations **170**A, **171**A, **172**A and perforations **170**B, **171**B, **172**B. In addition, such a shaped or configured tab **177**A, **177**B mitigates against the risk of the tab **177**A, **177**B passing through or out of engagement with the associated perforation. Similar configurations and shapes for the tabs **177**A, **177**B are envisioned without departing from the spirit and scope hereof.

With reference to FIGS. **7** and **8**, the locking slider **145** is made up of a retainer plate **175** and a locking plate **180** secured together at one end **185** using, for example, rivets **187**A, **187**B. The plates **175**,**180** are resiliently separable at the other end **190** relative to one another, as illustrated in FIG. **8**. The retainer plate **175** has wings **178**A, **178**B that are larger than any of the perforations **170**A, **171**A, **172**A and **170**B, **171**B, **172**B that allow the retention covers **150**A, **150**B to capture the retainer plate **175** along the entire travel of the locking slider **145** in the direction indicated by arrow D. To provide the resilient characteristics, the locking plate **180** may be made of spring steel or other suitable flexible or resilient material.

With the locking plate **180** in a relaxed position against the retainer plate **175** (FIG. **7**), tabs **177**A, **177**B engage perforations **171**A, **171**B, and the locking slider **145** is fixed relative to the longitudinal axis **117** of the chassis **115**. However, with the locking plate **180** separated from the retainer plate **175** (FIG. **8**), the tabs **177**A, **177**B are distanced from the perforations **171**A, **171**B, such that the locking slider **145** is free to move along the longitudinal axis **117** of the chassis **115** in the direction D.

The locking plate **180**, as previously described, is an elastic material that may be resiliently moved away from the retainer plate **175**. To promote separation of the locking plate **180** from the retainer plate **175**, a handle **194** (FIGS. **7** and **8**) may extend from the locking plate **180** for grasping to separate the locking plate **180** from the retainer plate **175**.

Returning to FIG. **5**A, the lumbar support pad **135** is secured to the locking slider **145** by a connector arrangement. The connector arrangement may be any of a number of different mechanical fasteners or arrangements known to those skilled in the art. However, as illustrated in FIG. **5**, and in one preferred and non-limiting embodiment, the connector arrangement includes a button **195** extending through the locking slider **145** and the lumbar support pad **135**. The button **195** has a head **197** at one end that engages the locking slider **145** and a groove **200** at the other end into which at least one connector, e.g., at least one spring clip **205**, is inserted or engaged to engage the lumbar support pad **135**. The assembled arrangement of these components is illustrated in FIG. **6**.

While the spring clip **205** engaging with button **195** is sufficient to retain the lumbar support pad **135** to the locking slider **145**, this design also permits the lumbar support pad **135** to rotate about the central axis and, as a result, to rotate relative to the chassis **115** (FIG. **2**) for the comfort of the individual utilizing the backpack. In particular, and with reference to FIGS. **6** and **9**, the button **195** has a central axis **196** upon which the lumbar support pad **135** may rotate relative to the chassis **115** or to the retention covers **150**A, **150**B fixed to the chassis **115**. With respect to FIG. **6**, since the retention covers **150**A, **150**B are fixed to the chassis **115**, the lumbar support pad **135** can rotate relative to these retention covers **150**A, **150**B. As previously described, the spring clip **205** is inserted within or engaged with a groove **200** of the button **195** to engage the lumbar support pad **135**.

As illustrated in FIG. **9**, the button groove **200** is non-circular, and the spring clip **205** is substantially in the shape of

a "U", having two extending primary legs **207**, **209** connected by a transition portion **210**. The lumbar pad **135** further includes a locating pin **215** spaced from the button **195** such that the transition portion **210** contacts the pin **215** and the legs **207**, **209** engage and straddle the non-circular groove **200** of the button **195**. As a result, rotation of the lumbar support pad **135** relative to the chassis **115** (or relative to the retention covers **150**A, **150**B) is resiliently resisted when the two legs **207**, **209** are spread apart, resulting in a self-centering arrangement.

As illustrated in FIG. **9**, the non-circular groove **200** may have the shape of a rectangle. Further, by using such a connector in the form of a spring clip **205** (or any similar such member with deflection characteristics), improved resiliency and deflection is provided to the user. This functionality, and its resulting benefits, may be further enhanced by using a plurality of the above-described spring clips **205**, or a spring clip **205** that includes a series of substantially "U" shaped portions with legs—thereby providing additional resiliency and deflection characteristics.

As shown in FIGS. **6** and **9**, and in one preferred and non-limiting embodiment, the lumbar support pad **135** has a cavity **225** surrounding the button **195**. The spring clip **205** rests within the cavity **225** and further includes two extending secondary legs **212**, **214** spaced from and attached to each respective primary leg **207**, **209** through transition portions **216**, **218** to define a serpentine shape, wherein the two extending secondary legs **212**, **214** are compressed against opposing walls **227**, **229** of the cavity **225** to provide additional resistance for self-centering.

In this manner, provided is a backpack **110** and adjustable lumber support **130** that represent improvements over existing backpacks and arrangements, with additional and beneficial functionality. The user can effectively adjust the backpack **110** using the adjustable lumber support **130** while wearing the backpack **110**, thus making it easier to adjust the position of the backpack **110** during use and in the field. Further, the backpack **110** and adjustable lumbar support **130** according to the present invention represent a simple design with minimal parts and components, thereby leading to reduced maintenance and more effective operation.

Although the invention has been described in detail for the purpose of illustration based on what is currently considered to be the most practical and preferred embodiments, it is to be understood that such detail is solely for that purpose and that the invention is not limited to the disclosed embodiments, but, on the contrary, is intended to cover modifications and equivalent arrangements that are within the spirit and scope of the appended claims. For example, it is to be understood that the present invention contemplates that, to the extent possible, one or more features of any embodiment can be combined with one or more features of any other embodiment.

What is claimed is:

1. An adjustable lumbar support for mounting upon the chassis of a backpack, comprising:

a) a lumbar support pad; and

b) a slider assembly slidably attaching the lumbar support pad to the chassis, wherein the assembly comprises a locking slider that, together with the support pad, is indexable to at least two different positions along the chassis, and wherein the locking slider comprises a retainer plate and locking plate secured together and resiliently separable, such that they can be spread apart relative to one another.

2. The adjustable lumbar support according to claim **1**, wherein the locking slider comprises a cantilevered elastic material with protruding tabs, wherein the tabs in a first position are engaged with the perforations and in a second position are disengaged from the perforations.

3. The adjustable lumbar support according to claim **1**, wherein the retainer plate has at least one wing that allows at least one retention cover to capture the retainer plate along substantially the entire travel of the slider.

4. The adjustable lumbar support according to claim **1**, wherein the locking plate includes a handle for grasping to separate the locking plate from the retainer plate.

5. The adjustable lumbar support according to claim **1**, wherein the lumbar support pad is secured to the locking slider by a connector arrangement.

6. The adjustable lumbar support according to claim **5**, wherein the connector arrangement includes a button with a head at one end that engages the locking slider and is secured to or against the lumbar support pad at the other end.

7. The adjustable lumbar support according to claim **6**, wherein the button has a groove at the other end into which at least one connector is inserted to engage the lumbar support pad.

8. The adjustable lumbar support according to claim **1**, wherein the slider assembly has opposing rails along which the locking slider moves.

9. The adjustable lumbar support according to claim **8**, wherein the rails are opposing retention covers adapted to be secured to the chassis, wherein each cover defines a channel therein in which the locking slider moves.

10. The adjustable lumbar support according to claim **9**, wherein at least one retention cover of the opposing retention covers has perforations adapted to engage the locking slider at different indexed positions.

11. The adjustable lumbar support according to claim **10**, wherein the perforations are in opposing pairs on each retention cover.

12. The adjustable lumbar support according to claim **10**, wherein the perforations are slots extending at least partially through the at least one retention cover.

13. A rotatable lumbar support for mounting upon the chassis of a backpack, comprising:

a) a lumbar support pad; and

b) a connector arrangement having a central axis, wherein the connector arrangement secures the lumbar support pad to the chassis and allows the lumbar support pad to rotate or deflect about the central axis relative to the chassis, and wherein the connector arrangement includes a button with a head at one end that engages a slider assembly and is engaged with the lumbar support pad at the other end.

14. The rotatable lumbar support according to claim **13**, wherein the button has a groove at the other end into which at least one connector is inserted to engage the lumbar support pad.

15. The rotatable lumbar support according to claim **14**, wherein the groove has a substantially rectangular shape.

16. The rotatable lumbar support according to claim **14**, wherein the connector arrangement comprises at least one spring clip that is substantially "U"-shaped having two extending primary legs connected by a transition portion, and wherein the slider assembly further includes a locating pin spaced from the button, such that the transition portion contacts the pin and the extending legs engage and straddle the groove of the button, such that rotation of the lumbar support pad relative to the chassis is resisted by resiliently spreading the two extending legs, thereby providing a self-centering arrangement.

17. The rotatable lumbar support according to claim **16**, wherein the lumbar support pad has a cavity about the button,

and wherein the at least one spring clip rests within the cavity, and further includes two extending secondary legs spaced from each primary leg segment to define a substantially serpentine shape, wherein the two extending legs are compressed against a wall defining the cavity to provide additional resistance for self-centering.

18. A backpack having an adjustable lumbar support, comprising:

a) a chassis with a longitudinal axis;

b) a lumbar support pad; and

c) a slider assembly slidably attaching the lumbar support pad to the chassis, wherein the slider assembly comprises a locking slider that, together with the support pad, is indexable to at least two different positions along the chassis, and wherein the locking slider comprises a retainer plate and locking plate secured together and resiliently separable, such that they can be spread apart relative to one another.

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